N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

Tzeng, Huey-Ming

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Research Design

Contributors
Sonia A. Duffy, PhD, RN
Lisa Kane Low, PhD, CNM, FACNM
Huey-Ming Tzeng, PhD, RN
Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

**Causality**
- A → B
- Pressure → Ulcer

**Multicausality**
- Years smoking
- High fat diet → Heart disease
- Limited exercise
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- Controlling the treatment
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
• Controlling extraneous variables

  o Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  o Random sampling
  o Sample: Heterogenous, homogeneous, or matching
  o Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

Yes

Is the primary purpose examination of relationships?

No

Descriptive Design

Yes

Quasi-Experimental Study

Is the treatment tightly controlled by the researcher?

Yes

Will a randomly assigned control group be used?

No

Is the original sample randomly selected?

Yes

Experimental Study

No

Correlational Design
Selecting a Descriptive Design

Examining sequences across time?

- No
- One Group?
  - No
  - Comparative Descriptive Design
  - Yes
  - Descriptive Design

- Yes
- Following same subjects across time?
  - No
  - Cross-sectional design
  - Yes
  - Studying events partitioned across time?
    - No
    - Trend Analysis
    - Yes
    - Repeated measures of each subject

- Yes
- Single unit of study
  - No
  - Longitudinal Study
  - Yes
  - Case Study

Cross-sectional design

Longitudinal design with treatment partitioning

Research Design
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

Variable 1 → Description of Variable 1
Variable 2 → Description of Variable 2
Variable 3 → Description of Variable 3
Variable 4 → Description of Variable 4

Interpretation of Meaning
Development of Hypotheses

Research Design
A Comparative Descriptive Design

Group I
{variables measured}

Describe

Comparison of Groups on Selected Variables

Interpretation of Meaning

Group II
{variables measured}

Describe

Development of Hypotheses
### Selecting the Type of Correlational Design

<table>
<thead>
<tr>
<th>Describe relationships between/among variables?</th>
<th>Predict relationships between/among variables?</th>
<th>Test theoretically proposed Relationships?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive correlational design</td>
<td>Predictive correlational design</td>
<td>Model testing design</td>
</tr>
</tbody>
</table>
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Description of variable

Development of Hypotheses

Research Variable 2
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

- Control Group?
  - No
    - Pretest?
      - No
        - One-group post-test only design
      - Yes
        - Repeated Measures?
          - No
            - Strategy for Comparison
              - No
                - Suggest Reevaluating design
              - Yes
                - Compare treatment & control conditions?
      - Yes
        - Repeated Measures?
          - No
            - Suggest Reevaluating design
          - Yes
            - Compare treatment & control conditions?
Selecting The Type of Experimental Design

Pretest

- Yes
  - Repeated Measurements?
    - Yes
      - Repeated measures design
    - No
      - Examine effects of confounding variables?
        - Yes
          - Blocking?
            - Yes
              - Randomized Block Design
            - No
              - Comparison of multiple levels of treatment
                - Yes
                  - Nested Designs
                - No
                  - Examination of complex relationships among variables in relation to treatment
        - No
          - Multiple sites?
            - Yes
              - Randomized experiments
            - No
              - Pretest/post-test control group design
## Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>PRETEST</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td></td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

### Treatment:
- Under control of researcher

### Findings:
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

### Example:

### Uncontrolled threats to validity:
- Testing
- Mortality

### Controlled threats to validity:
- Instrumentation
- Restricted generalizability as control increases
### Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<th>Treatment:</th>
<th>Findings:</th>
<th>Example:</th>
</tr>
</thead>
</table>

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<th>Uncontrolled threats to validity:</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Instrumentation</td>
<td>Mortality</td>
<td>Limited generalizability as control increases</td>
</tr>
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</table>
### Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>PRN Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit B</td>
<td>Unit F</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit G</td>
</tr>
<tr>
<td>Unit D</td>
<td>Unit H</td>
</tr>
</tbody>
</table>

### Primary Nursing Care

<table>
<thead>
<tr>
<th>Primary Care</th>
<th>No Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit B</td>
</tr>
<tr>
<td>Unit C</td>
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Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design